

Status of the « antinequenching » issue (I)

A note summarizing the quenching analysis and discussing the results is almost complete and should be circulated soon.

I have investigated the possibility of different decay times bringing about the observed antinequenching effect.

In the literature (F. Benrachi et al., NIM A281 (1989) 137):

$$L(t) = \frac{h_f}{\tau_f} \exp\left(-\frac{t}{\tau_f}\right) + \frac{h_s}{\tau_s} \exp\left(-\frac{t}{\tau_s}\right)$$

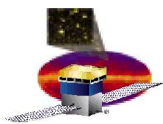
Fast component: $\tau_f=0.5-1 \mu\text{s}$ dependent on the particle

Slow component: $\tau_s=7 \mu\text{s}$ for all particles

10% for heavy ions, regardless of E

35% for protons and increasing with E

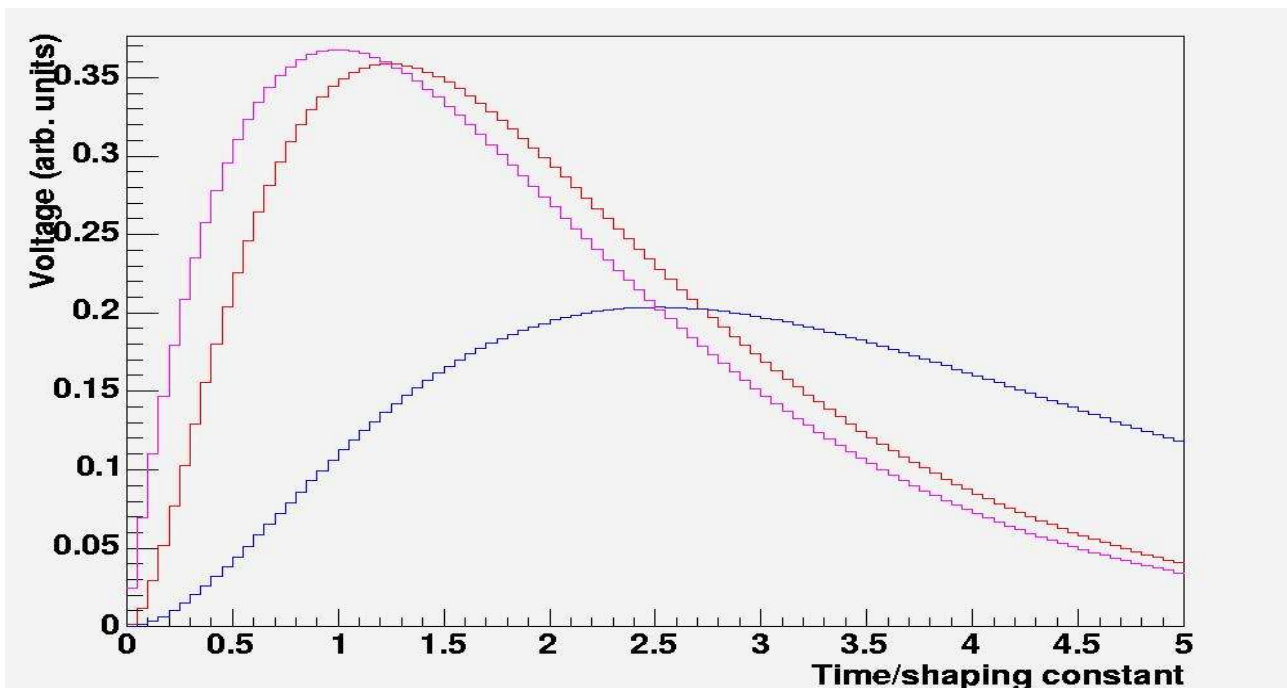
Data limited to $E_{\text{max}} = 23 \text{ MeV/nucleon}$

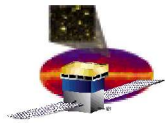


Status of the « antiquenching » issue (II)

I have calculated the **shape** of the **voltage pulses** output by the amplification chain, for charge pulses with different time distributions: a delta function (pink), an exponential with $\tau = 0.5 \mu\text{s}$ (red), and an exponential with $\tau = 7 \mu\text{s}$ (blue). The shaping constant is taken as $3.5 \mu\text{s}$.

Data would be useful to clarify this point...





Direct energy deposition in diodes (I)

Talk given by David Smith at next Friday's I&T meeting

Bottom line:

A muon traversing a log normally leaves 12 MeV.

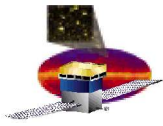
This energy corresponds to $12 \text{ MeV} \times 5000 \text{ e/MeV} = 60000 \text{ electrons}$ in one diode, if the hit occurs at the log midpoint.

For a muon traversing a diode normally, the energy deposition is:

$$0.03 \text{ cm} \times 2.33 \text{ g cm}^{-3} \times 1.2 \text{ MeV/g cm}^{-2} = 0.10 \text{ MeV}$$

This value is confirmed by GEANT4 simulations.

This energy produces: $0.10 / 3.6 \times 10^{-6} = 30000 \text{ electrons}$, equivalent to 6 MeV deposited in the CsI log.



Direct energy deposition in diodes (II)

We did different measurements with

-one CsI log + photodiode;

-one naked photodiode using the same electronics (preamp...).

The trigger was provided by a 2-scintillator telescope (see David's talk).

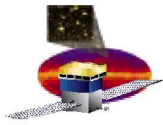
We checked the consistency of the data with a ^{22}Na source.

Result: the direct energy deposit corresponds to about 2.5 MeV, 40% of the expected value.

Question:

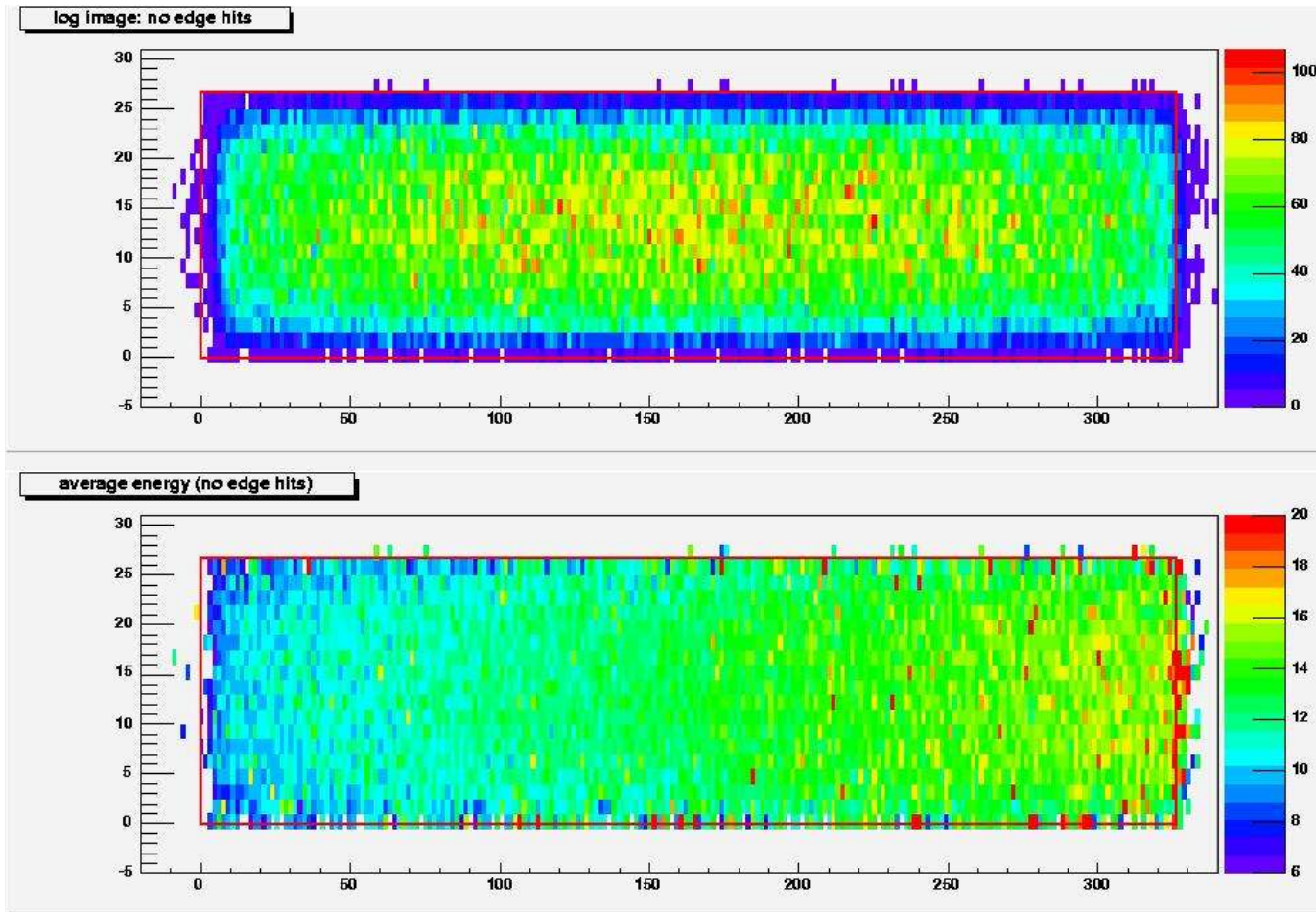
Where does the 5000 e/MeV value come from?

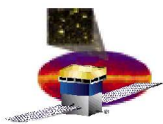
Wasn't it extracted in the very same way? (X-rays from ^{241}Am)



Log imaging (I&T)

- Extrapolation of the trajectory into Cal using the Tkr information
- Rejection of edge hits





Valid events for calibration (I&T)

4M events in total, 219040 triggering events

